

CLAIMS:

1. In a fine channel device comprising a fine channel provided with at least two inlet ports for feeding fluid, inlet channels communicated with the inlet ports, a
5 confluent portion communicated with the inlet channels, a branch portion communicated with the fine channel, from which at least two outlet channels are branched to feed predetermined amounts of fluid, and outlet ports communicated with the outlet channels, the fine channel
10 device being characterized in that the fine channel is provided with a plurality of partition walls arranged along a boundary formed by at least two kinds of fluid fed from the inlet ports so as not to cause mutual contamination of fluid.
- 15 2. The fine channel device according to Claim 1, wherein the plurality of partition walls are arranged with intervals in a flowing direction of fluid.
3. The fine channel device according to Claim 1 or 2, wherein the height of partition walls is substantially
20 the same as the depth of the fine channel.
4. The fine channel device according to any one of Claims 1 to 3, wherein partition walls are provided at positions apart from the confluent portion and the branch portion.
- 25 5. The fine channel device according to any one of Claims 1 to 3, wherein in the plurality of partition walls, the partition wall located closest to the branch

portion of the fine channel is connected to the branch portion.

6. The fine channel device according to any one of Claims 1 to 3, wherein in the plurality of partition
5 walls, there is at least one absent location of partition wall except the vicinity of the confluent portion and the vicinity of the branch portion of the fine channel.

7. The fine channel device according to any one of Claims 1 to 6, wherein the maximum length of a partition
10 wall in a flowing direction of fluid in the plurality of partition walls is less than any distance between adjacent partition walls in the flowing direction of fluid.

8. The fine channel device according to any one of
15 Claims 1 to 7, wherein a portion of the fine channel has a shape other than a straight shape, and the partition wall in said portion extends from the vicinity of a portion originating a non-straight portion of fine channel to the vicinity of a portion ending the non-
20 straight portion of fine channel.

9. The fine channel device according to any one of Claims 1 to 8, wherein in the vicinity of the inlet channels and/or the outlet channels of the fine channel, a distance between adjacent partition walls in a flowing
25 direction of fluid is smaller than a distance between adjacent partition walls in the flowing direction of fluid in a portion other than the vicinity of the inlet

channels and/or the outlet channels of the fine channel.

10. The fine channel device according to any one of
Claims 1 to 8, wherein in the vicinity of the inlet
channels and/or the outlet channels of the fine channel,
5 at least two partition walls are connected continuously
in a flowing direction of fluid.

11. The fine channel device according to any one of
Claims 1 to 10, wherein a plurality of projections are
formed at the inner wall of the fine channel partitioned
10 by partition walls to such an extent capable of
maintaining a flow of fluid.

12. The fine channel device according to any one of
Claims 1 to 11, wherein said at least two inlet ports for
feeding fluid, the inlet channels communicated with the
15 inlet ports, said at least two outlet channels and outlet
ports communicated with the outlet channels are arranged
so that the flowing direction of either one of at least
two kinds of fluid fed in the fine channel is opposite to
the flowing direction of the other of said at least two
20 kinds of fluid fed adjacently in the fine channel.

13. The fine channel device according to any one of
Claims 1 to 12, wherein the inner wall at one side of the
fine channel partitioned by partition walls has
amicability to hydrophilic/hydrophobic properties to a
25 kind of fluid fed into the fine channel.

14. The fine channel device according to Claim 13,
wherein hydrophilic properties of a material for the

inner wall at one side of the fine channel partitioned by partition walls are different from hydrophilic properties of the fluid fed into the fine channel.

15. The fine channel device according to any one of
5 Claims 1 to 14, wherein a film having fine pores a diameter of which is smaller than any distance between adjacent partition walls is provided between adjacent partition walls in a flowing direction of fluid.

16. The fine channel device according to Claim 15,
10 wherein the film is made of a polymeric material and/or an inorganic material.

17. The fine channel device according to any one of Claims 1 to 16, wherein a metallic film is disposed in the entire or a part of the inner surface of the fine
15 channel and/or the wall surface of the partition walls.

18. The fine channel device according to Claim 17, which further comprises a current supply means and/or a voltage supply means for the metallic film.

19. The fine channel device according to any one of
20 Claims 1 to 18, which further comprises a circulating channel to feed fluid discharged from an outlet port to an inlet port.

20. The fine channel device according to Claim 19, which further comprises a reservoir tank communicated with the
25 circulating channel and a pump in order to store the supplied fluid temporally.

21. The fine channel device according to any one of

claims 1 to 20, which further comprises means for supplying energy to fluid flowing the fine channel.

22. The fine channel device according to Claim 21, wherein said means for supplying energy to fluid is a heating device and/or a light irradiation device.

23. A fine channel device characterized in that a plurality of fine channels each as described in any one of claims 1 to 17 are formed in a two-dimensionally or a three dimensionally.

24. In a fine channel device comprising a fine channel provided with at least two inlet ports for feeding fluid, inlet channels communicated with the inlet ports, a confluent portion communicated with the inlet channels, a branch portion communicated with the fine channel, from which at least two outlet channels are branched to feed predetermined amounts of fluid, and outlet ports communicated with the outlet channels, the fine channel device being characterized in that the fine channel is provided with a plurality of partition walls, each having a height substantially the same as the depth of the fine channel, arranged along a boundary formed by at least two kinds of fluid fed from the inlet ports so as not to cause mutual contamination of fluid, wherein there is at least one absent location of partition wall except the vicinity of the confluent portion and the vicinity of the branch portion of the fine channel.

25. A chemically operating method characterized in that

a fine channel device described in any one of Claims 1 to 24 is used to mix by molecular diffusion at least two kinds of fluid contacting through the partition walls in the fine channel.

5 26. The chemically operating method according to Claim 25, wherein fine particles are mixed to at least one of said at least two kinds of fluid, and the fluid is stirred while the fluid boundary is maintained to accelerate the mixing.

10 27. A chemically operating method characterized in that a fine channel device described in any one of Claims 1 to 24 is used to cause a chemical reaction of at least two kinds of fluid contacting through the partition walls in the fine channel.

15 28. A chemically operating method characterized in that a fine channel device described in any one of Claims 1 to 24 is used to make an extracted solvent contact with an extracting solvent through the partition walls in the fine channel to extract an extracted substance by phase
20 transfer.

29. A chemically operating method characterized in that a fine channel device described in any one of Claims 1 to 24 is used to separate at least two kinds of fluid contacting through the partition walls in the fine
25 channel.

30. The chemically operating method according to Claim 29, wherein at least one kind of separated fluid is

circulated to feed it again to an inlet port.

31. The chemically operating method according to Claim
30, wherein the separated fluid is discharged from an
outlet port through an outlet channel, and the discharged
5 fluid is fed again to an inlet port.

32. A chemically operating method characterized in that
a fine channel device described in any one of Claims 1 to
24 is used to supply energy to fluid flowing in the fine
channel.

10 33. The chemically operating method according to Claim
32, wherein said energy is heat and/or light.

34. A chemically operating method characterized in that
a fine channel device described in any one of Claims 1 to
24 is used, and at least two chemically operating methods
15 each described in any one of Claims 25 to 33 are
conducted in an arbitrary combination.